25 ~~18~~. (twice amended) An apparatus for compressing a digital input signal, the apparatus comprising:

block length decision means for determining a division of the digital input signal into blocks in response to an index;

block floating means for applying block floating processing to each of the blocks of the digital input signal using the index as a block floating coefficient; and

means for deriving [plural] spectral coefficients from the block floating processed blocks of the digital input signal; and

G1

adaptive bit allocation means for dividing the spectral coefficients by frequency into bands and for adaptively allocating a number of quantizing bits for quantizing the spectral coefficients in each of the bands in response to an allowable noise level for each of the bands, the adaptive bit allocation means including: [comprising:]

allowable noise level calculation means for calculating an allowable noise level for each of the bands,

comparing means for comparing, in each of the bands, the allowable noise level with a minimum audible level, and

selecting means for selecting the minimum audible level as the allowable noise level in each of the bands for which the comparing means determines that the minimum audible level is higher than the allowable noise level.

26 ~~19~~. (amended) The apparatus of claim 25 ~~18~~, wherein the means for deriving [plural] spectral coefficients from the digital input signal includes an orthogonal transform circuit.

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29 ~~21~~. (twice amended) The apparatus of claims 25, ~~18~~ or 28 ~~19~~, wherein:

the number of quantizing bits adaptively allocated by the adaptive bit allocation means is an actual number of bits;

the apparatus additionally includes:

means for providing an output signal including a target number of bits, and

means for determining an error between the actual number of bits and the target number of bits; and

the allowable noise level calculation means includes means for adjusting the allowable noise level in ones of the bands in response to the error between the actual number of bits and the target number of bits.

30 ~~22~~. (twice amended) The apparatus of claim 29 ~~21~~, wherein the adaptive bit allocation means adjusts the number of quantizing bits allocated to the bands in response to changes in the allowable noise level in the ones of the bands caused by the means for adjusting the allowable noise level.

G2

28 ~~24~~. (twice amended) The apparatus of claims ~~18~~ 25 or ~~19~~ 26 wherein:

the bands into which [whereinto] the adaptive bit allocation means divides the spectral coefficients include a band corresponding to a critical band;

the adaptive bit allocation means is additionally for dividing the spectral coefficients in the band corresponding to a critical band into [plural] sub bands, the [plural] sub bands including a lowest-frequency sub band;

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the comparing means is for comparing, in the band corresponding to a critical band, the allowable noise level for the band corresponding to a critical band with the minimum audible level for the lowest-frequency sub band; and

the selecting means is for selecting, as the allowable noise level for the sub bands in the band corresponding to a critical band, the respective minimum audible levels [level] for the sub bands [lowest-frequency sub band] when the comparing means indicates that the minimum audible level for the lowest-frequency sub band is higher than the allowable noise level.

51 ~~59~~. An apparatus for compressing a digital input signal, the apparatus comprising:

means for deriving spectral coefficients from the digital input signal;

frequency dividing means for dividing the spectral coefficients by frequency into bands, the bands including a band corresponding to a critical band, and additionally for subdividing the spectral coefficients in the band by frequency into sub bands, the sub bands including a lowest-frequency sub band;

64 cont

allowable noise level calculation means for calculating a allowable noise level for each of the bands;

supplying means for supplying a minimum audible level for each of the bands except the band, and for each of the sub bands in the band;

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comparing means for determining, in each of the bands except the band, when the minimum audible level supplied by the supplying means is greater than the allowable noise level calculated by the allowable noise level calculation means, and for determining, in the band, when the minimum audible level supplied by the supplying means for only the lowest-frequency sub band is greater than the allowable noise level calculated by the allowable noise level calculation means for the band;

substituting means for substituting, in each one of the bands in which the comparing means determines that the minimum audible level is greater than the allowable noise level, the minimum audible level supplied by the supplying means for the allowable noise level calculated by the allowable noise level calculating means as the allowable noise level for the one of the bands, and for substituting, in each one of the sub bands in the band when the comparing means determines that the minimum audible level for the lowest-frequency sub band is greater than the allowable noise level for the band, the minimum audible level supplied for the one of the sub bands by the supplying means for the allowable noise level calculated for the band by the allowable noise level calculation means as the allowable noise level for the one of the sub bands; and

Ext Cont

adaptive bit allocation means for adaptively allocating a number of quantizing bits among the bands and the sub bands for quantizing the spectral coefficients therein, the bit allocation means allocating quantizing bits among the bands and the sub bands in response to the allowable noise level for each of the bands and sub bands.

58 ~~60~~. The apparatus of claim 57 ~~59~~, wherein the means for deriving spectral coefficients from the digital input signal includes an orthogonal transform circuit.

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59 ~~61~~. The apparatus of claim ~~60~~ 58, wherein the orthogonal transform circuit is a Discrete Cosine Transform (DCT) circuit.

60 ~~62~~. The apparatus of claim ~~59~~ 57, wherein:

the number of quantizing bits adaptively allocated by the adaptive bit allocation means is an actual number of bits;

the apparatus additionally includes:

means for providing an output signal including a target number of bits, and

means for determining an error between the actual number of bits and the target number of bits; and

the allowable noise level calculation means includes means for adjusting the allowable noise level in ones of the bands and the sub bands in response to the error between the actual number of bits and the target number of bits.

a4 cond

61 ~~63~~. The apparatus of claim ~~62~~ 60, wherein the adaptive bit allocation means adjusts the number of quantizing bits adaptively allocated to the bands in response to changes in the allowable noise level in the ones of the bands and the sub bands caused by the means for adjusting the allowable noise level.

62 ~~64~~. The apparatus of claim ~~59~~ 57, wherein the means for deriving spectral coefficients from the digital input signal includes:

block length decision means for determining a division of the digital input signal into blocks in response to an index;

block floating means for applying block floating processing to each block of the digital input signal using the index as a block floating coefficient; and

means for deriving the spectral coefficients from the block floating processed blocks of the digital input signal.

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42 ~~43~~. (twice amended) A method for compressing a digital input signal, the method comprising [the] steps of:

determining a division of the digital input signal into blocks in response to an index;

applying block floating processing to each of the blocks of the digital input signal using the index as a block floating coefficient;

deriving [plural] spectral coefficients from the block floating processed blocks of the digital input signal;

dividing the spectral coefficients by frequency into bands; and

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adaptively allocating a number of quantizing bits for quantizing the spectral coefficients in each of the bands in response to an allowable noise level for each of the bands, the step of adaptively allocating a number of quantizing bits including [comprising] steps of:

calculating an allowable noise level for each of the bands,

comparing, in each of the bands, the allowable noise level with a minimum audible level, and

selecting the minimum audible level as the allowable noise level in each of the bands for which the step of comparing determines that the minimum audible level is higher than the allowable noise level.

43 ~~44~~. (twice amended) The method of claim 42 ~~43~~, wherein the step of deriving [plural] spectral coefficients from the digital input signal includes a step of orthogonally transforming the digital input signal.

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45 ~~46~~. (twice amended) The method of claims ~~43~~ 42 or ~~44~~ 43, wherein the method is for compressing the digital input signal to provide a compressed signal including a target number of bits, and wherein:

in the step of adaptively allocating a number of quantizing bits, the number of bits adaptively allocated is an actual number of bits;

the method additionally includes a [the] step of determining an error between the actual number of bits and the target number of bits; and

the step of adaptively allocating a number of quantizing bits includes a [the] step of adjusting the allowable noise level in ones of the bands in response to the error between the actual number of bits and the target number of bits.

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46 ~~47~~. (twice amended) The method of claim 45 ~~46~~, wherein, in the step of adaptively allocating a number of quantizing bits, the number of quantizing bits allocated to the ones of the bands and the sub bands is adjusted in response to changes in the allowable noise level caused by the step of adjusting the allowable noise level.

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42 43

47 ~~49~~. (twice amended) The method of claims ~~43~~ or ~~44~~, wherein:

in the step dividing the spectral coefficients into bands, the spectral <u>coefficients</u> [components] are divided into bands including a band corresponding to a critical band, and the spectral coefficients in the band corresponding to a critical band are divided into [plural] sub bands, the [plural] sub bands including a lowest-frequency sub band;

C7 cont

in the step of comparing, the allowable noise level for the band corresponding to a critical band is compared with the minimum audible level for the lowest-frequency sub band; and

in the step of selecting, the minimum audible level for the lowest-frequency sub band is selected as the allowable noise level for the band corresponding to a critical band when the step of comparing indicates that the minimum audible level for the lowest-frequency sub band is higher than the allowable noise level.

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48 ~~50~~. (twice amended) The method of claim 42 ~~43~~, wherein:

the method additionally [step of deriving plural spectral coefficients from the digital input signal] comprises a step of [steps of:] dividing the digital input signal into plural signals, each of the plural signals being in a respective one of plural frequency ranges, the plural signals including a frequency range signal in one of the plural frequency ranges;

E7 Concl

the step of determining a division of the digital input signal into blocks includes a step of generating the [an] index in response to the frequency range signal;

in the step of determining a division of the digital input signal into blocks, a division of the frequency range signal into blocks is determined in response to the index;

in the step of applying block floating processing to each of the blocks of the digital input signal, block floating is applied to the blocks of the frequency range signal in response to the index to generate a block of a block floating processed frequency range signal from each of the blocks of the frequency range signal; and

the step of deriving spectral coefficients from the block floating processed blocks of the digital input signal includes a step of orthogonally transforming the block floating processed block of the frequency range signal to produce ones of the [plural] spectral coefficients.

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~~65~~ 63. A method for compressing a digital input signal, the method comprising steps of:

deriving spectral coefficients from the digital input signal;

dividing the spectral coefficients by frequency into bands, the bands including a band corresponding to a critical band;

subdividing the spectral coefficients in the band by frequency into sub bands, the sub bands including a lowest-frequency sub band;

calculating an allowable noise level for each of the bands;

supplying a minimum audible level for each of the bands except the band, and for each of the sub bands in the band;

68 cont

determining, in each of the bands except the band, when the minimum audible level supplied in the supplying step is greater than the allowable noise level calculated in the allowable noise level calculating step, and determining, in the band, when the minimum audible level supplied in the supplying step for only the lowest-frequency sub band is greater than the allowable noise level calculated for the band in the allowable noise level calculating step;

substituting, in each one of the bands in which determining step determines that the minimum audible level is greater than the allowable noise level, the minimum audible level supplied in the supplying step for the allowable noise level calculated in the allowable noise level calculating step as the allowable noise level for the one of the bands, and substituting, in each one of the sub bands in the band when the determining step determines that the minimum audible level for the lowest-frequency sub band is greater than the allowable noise level for the band, the minimum audible level supplied for the one of the sub bands in the supplying step for the allowable noise level calculated for the band in the allowable noise level calculating step as the allowable noise level for the one of the sub bands; and

adaptively allocating a number of quantizing bits among the bands and the sub bands for quantizing the spectral coefficients therein, the

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quantizing bits being adaptively allocated to each of the bands and the sub bands in response to the allowable noise level for each of the bands and sub bands.

64 ~~66~~. The method of claim 63 ~~65~~, wherein the step of deriving spectral coefficients from the digital input signal includes a step of orthogonally transforming the digital input signal.

65 ~~67~~. The method of claim 64 ~~66~~, wherein, in the step of orthogonally transforming the digital input signal, the digital input signal is orthogonally transformed using a discrete cosine transform.

Q8 cont

66 ~~68~~. The method of claim 63 ~~65~~, wherein the method is for compressing the digital input signal to provide a compressed signal including a target number of bits, and wherein:

in the step of adaptively allocating a number of quantizing bits, the number of bits adaptively allocated is an actual number of bits;

the method additionally includes a step of determining an error between the actual number of bits and the target number of bits; and

the step of adaptively allocating a number of quantizing bits includes a step of adjusting the allowable noise level in ones of the bands and the sub bands in response to the error between the actual number of bits and the target number of bits.

67 ~~69~~. The method of claim 66 ~~68~~, wherein, in the step of adaptively allocating a number of quantizing bits, the number of quantizing bits allocated to each of the bands and sub bands is adjusted in response to changes in the allowable noise level in the ones of the bands and the sub bands caused by the step of adjusting the allowable noise level.

63

a8 cont

68 ~~70~~. The method of claim 63 ~~65~~, wherein the step of deriving spectral coefficients from the digital input signal includes steps of:

determining a division of the digital input signal into blocks in response to an index;

applying block floating processing to each block of the digital input signal using the index as a block floating coefficient; and

deriving the spectral coefficients from the block floating processed blocks of the digital input signal.

Remarks

Following this amendment, claims 1-70 are active in the application.

I. Objections to the Drawings

The drawings are objected to because Figures 15 and 16 should be labelled as "Prior art." The Examiner cites page 3 and the brief description of the drawings at page 10. The applicants respectfully request the Examiner's approval of the proposed changes to the drawing of Figures 15 and 16 indicated in red ink.

II. Allowed and Allowable Claims

The applicants note with appreciation the Examiner's indication that claims 1-17, 25-42, and 51-58 are allowed, and that claims 23, 48, and 50 would be allowable if rewritten in independent form.

III. Claim Rejections under 35 USC § 102(e)

Claims 18-22, 24, 43-47 and 49 are rejected under 35 USC § 102(e) as being anticipated by United States patent no. 5,151,941 of Nishiguchi et al. ("Nishiguchi").

The applicants have amended the claims to overcome the rejection over Nishiguchi. The applicants have amended claims 18 and 43 to

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